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Grumman Managing Advanced Simulator Program

Grumman Electronics Systems Division will manage the design and fabrication of four advanced flight simulators for the Naval Air Systems Command under a $140 million contract. The Navy also has options for up to 13 more simulators. If exercised, these options would push the total value of the contract to over $445 million.

These simulators will be used to train the crews that will fly Grumman's new F-14D and A-6F aircraft. The first simulator will be installed in 1990 at the Miramar Naval Air Station in San Diego.

"A subcontractor team — McDonnell Douglas and AAI Corporation (a manufacturer of avionics test equipment and simulation systems) — has prime responsibility for the design and fabrication of the simulators," says Harry Beaton, vice president for Display and Trainer Systems. "We will be the systems engineering manager of NAVAIR. We'll also provide the subcontractor team with the necessary F-14D and A-6F data for simulator design and aircraft avionics common to the trainers."

Grumman's work, which began April 30, represents about 20 percent of the contract's value. A Grumman team visited Miramar Naval Air Station in California to coordinate Navy construction plans for the building that will house the huge F-14D simulators. A similar meeting is planned at Whidbey Island Naval Air Station in Washington for the A-6F trainers.

Three of the four simulators will be for the F-14D program. One will train the crew in basic flight procedures, one — the weapon system trainer — will be used for weapons delivery, electronic warfare and the like. The third, the Tactical Environment Simulator (TES), will be a network of cockpits that will simulate battle group operations. "There are trainers that teach formation flying and one-on-one air combat," says Beaton, "but nothing as sophisticated as TES."

The F-14D weapon system trainer will be inside a 40-foot dome, similar to a planetarium. A real-world visual display is projected onto the inside surface of the dome.

"These simulators are advanced, state-of-the-art, visual and radar simulations systems," says Beaton. "During a training mission on the simulators, crews will see the movements of friendly and enemy forces — planes, missiles and ships — just as they would during real flight."

In the simulators, the crews will fly full missions from takeoff to landings, including carrier landings. While the cockpits won't be mounted on moving platforms, the crews will get a sense of motion from g-suits and g-seats that, coupled with visual cues, will make them feel the pull of gravity.

The fourth simulator will train the two-man A-6F crews to work together. Ninety percent of what an A-6F must accomplish during a mission depends on the close interaction of the pilot and the bombardier/navigator.

Plans call for the first A-6F simulator to be installed at Whidbey Island. If the Navy exercises options on the A-6F simulators, there will be identical units at Whidbey and Oceana Naval Air Station in Virginia.

About 35-40 Grummanites will work on the program; they will be supported by other Grumman units as the need arises.

There are now about 130 people working at the Display and Trainer Systems facilities in Bohemia, Long Island.■

A Part Of The Business. *Grumman is an old hand at developing trainers and simulators. This E-2C Tactics Trainer was installed in 1981 at the Miramar NAS in California. Three years later, Grumman installed another at Oceana, Virginia. Today, the Electronics Systems Division has a lab in Bohemia with an identical trainer that's used to integrate trainer upgrades.*

Hospitals Agency Taps GSS

The New York Health and Hospitals Corporation has awarded Grumman Systems Support (GSS) a contract to maintain computer systems and communications networks at 23 locations throughout New York City. GSS is a unit of the Data Systems Division.

Under this $6.4 million contract, GSS will provide both on-site and depot maintenance services. Depot repairs will be done at Grumman's repair center in Woodbury, Long Island.

GSS, which provides third-party maintenance services for the computer hardware of government and commercial customers, had a smaller contract with the Health and Hospital Corporation. The new contract triples the amount of work GSS service engineers will do for the corporation.■

Leaving The Nest. *The Navy took delivery of the last of the Grumman F-14A versions — aircraft number 557 — on April 15. While the first production F-14A+ isn't due to complete the Calverton final assembly process until November, Grummanites there will be busy producing the upgraded Block 60/65 Tomcats for the Naval Reserve in the interim. (Photo by Gerry Costello)*

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Eleven Grummanites Receive Fellowships

Eleven Grummanites have been chosen as recipients of 1987 Grumman Science and Engineering Masters Fellowships. All work in Bethpage.

Grumman pays all costs for tuition, books and fees.

Fellows take nine credits per semester toward a master's in a technical field. During the two-year program, they are considered full-time employees: they must put in at least 24 work hours a week during the academic year. During summer recess, they return to a 40-hour work week. They receive a $1,200 tax-free stipend to defray study time they take off without pay.

Another benefit of the program is the rotational work assignment. Each fellow gets four six-month assignments in different areas of Grumman. These are matched as closely as possible with career interests.

Those who recently received Grumman fellowships were:

Pete Cardinale of Materials and

Manufacturing Development's Mechanical Technology group has a bachelor's degree from Weber State College in manufacturing engineering. In graduate school, he plans to study computer science with a concentration in artificial intelligence.

Ratnadeep Damle of Stability & Control/Flying

Qualities graduated from the Massachusetts Institute of Technology with a degree in electrical engineering. He will continue his studies in that field with a concentration in communication and control systems/information science.

Henry Donald of Stability & Control/Flying Qualities received his bachelor's degree in aeronautical engineering from the University of Michigan. He will study systems engineering with a concentration in control theory analysis and design. (Not available for photo session.)

Paul Eng of Aircraft Performance

graduated from the State University of New York at Buffalo with a degree in aerospace engineering. He will pursue a master's degree in mechanical engineering with a concentration in thermal/fluids/energy.

Ernest Eydelman of Systems

Integration Verification and Validation graduated from Polytechnic Institute of New York with a degree in electrical engineering. He plans to continue his studies in that field with a concentration in systems design.

Ethel Kleinhans of Master

Dimensions received her undergraduate degree in math/computer science from Hofstra University. In graduate school, she will study computer science, concentrating on software and applied mathematics.

Paul LeMire Jr. of Methods

Engineering received his mechanical engineering degree from Manhattan College. He will study systems engineering in graduate school; his concentration will be resource management.

James Nicolard of Custom VLSI

Components received his bachelor's from Polytechnic University in computer science. He plans to continue his studies in this field, concentrating on computer architecture.

Ralph Pallmer of Flight

Controls/Mechanisms graduated from Polytechnic University with a degree in aerospace engineering. He will study computer science with a concentration in robotics, systems control and automation.

Susan Tanenbaum of Propulsion

Systems holds a bachelor's degree in mechanical engineering from Tufts University. She will continue her studies in that field while concentrating in fluid mechanics and heat transfer.

Daniela Zounek of Computer

Architecture holds a bachelor's degree in computer science from the New York Institute of Technology. She plans to continue her studies in that field with a concentration in systems engineering.

The Masters Fellowship Program is open to all Grummanites in Aircraft Systems, Aerostructures, Electronics Systems, and Space Systems. Applications are available after the first of the year; deadline is February 28.■

Next Edition Distributed June 12th

He Likes The Fit. *Bombardier/navigator Lt. Mark Gonzalez gets a feel for the controls and displays of Grumman's new A-6F in the B/N's seat of the cockpit lighting mockup. Earlier this month, the Navy's A-6F team in Calverton studied the mockup for design and layout of the instruments and for adequacy of the lighting. (Photo by Gerry Costello)*

Check Up On Latest PPO Dentists At Employee Services

This year, the Grumman/Travelers dental insurance plan is offering a preferred provider organization (PPO). All eligible Grummanites were mailed a directory of participating dentists earlier this year. This listing has been revised; Employee Services offices have an up-to-date list for your reference.

The dental PPO is a group of dentists who have agreed to a rate structure for their services. For some procedures, a PPO dentist may charge amounts equal to those in the dental schedule of benefits.

You don't have to sign up with the dental PPO. Everyone who belongs to the Grumman/Travelers dental plan gets it automatically. Therefore, you can use a PPO dentist for one procedure, a non-PPO dentist for another, and be covered for both. Your out-of-pocket expenses, however, will be less with a PPO dentist.

Unit Values

Here are the Grumman Employee Investment Plan unit values as of March 31 (compared to February 28 figures):

Equity Fund
4.508 up from 4.427

Fixed Income Fund
5.830 down from 5.857

Guaranteed Income Fund
2.470 up from 2.448

Company Stock Fund
$27.25 down from $30.63

Note: It usually takes several weeks to formulate Grumman Employee Investment Plan unit values. Investment Plan members can call Ext. (111) 54400 (outside Grumman, call 516-575-4400) for a recorded message which is made as soon as the new unit values are available.

Don't Withhold This IRS Form

Reacting to criticism that the new W-4 form was too complicated, the Internal Revenue Service has issued a simplified version: the W-4A. The W-4A will be available at Employee Services offices shortly.

To date, 60 percent of all Grummanites have filed a federal withholding form with Personnel Records. Delays in filing will probably lead to under-withholding and possible penalties. However, the IRS has announced that it will waive penalties on under-withheld wages if a new W-4 or W-4A is filed in good faith by June 1.

The waiver of penalties does not apply to under-withholding on non-wage income. To cover any non-wage income, either increase withholding on wages or make estimated tax payments directly to the IRS using Form 1040-ES.

'RobSim': A Sneak Peek At Future Space Robots

Data Systems lab will improve graphics that simulate robotic techniques for building the Space Station

Building the Space Station in orbit will require help from highly sophisticated robots — and Grumman's Data Systems Division is now working on software to simulate the job.

The division recently won a contract from NASA's Langley Research Center to improve NASA's Robotic Simulation software, "RobSim" for short. RobSim was designed by Martin Marietta, which lost the bid for this phase of work.

Most of the work will be done by the Data Systems Graphics Laboratory in Woodbury, Long Island. Grummanites from the Corporate Research Center and the Space Systems Division will also be involved in the effort.

The graphics will depict snapping various parts of the Space Station together, as well as maintenance tasks such as the replacement of a battery. "One of the important uses for such a simulation is to evaluate robotic designs and operating techniques before you build hardware," says Walter Meyer, principal investigator for the study. "It's a tremendous cost and time saver.

"Suppose you have in mind a particular robot design," he explains. "With a simulation program, you can describe your idea to the computer, and have a rendition of it in hours. You can then tinker with it, and see if it will actually accomplish what you want it to do. Building physical hardware would take months."

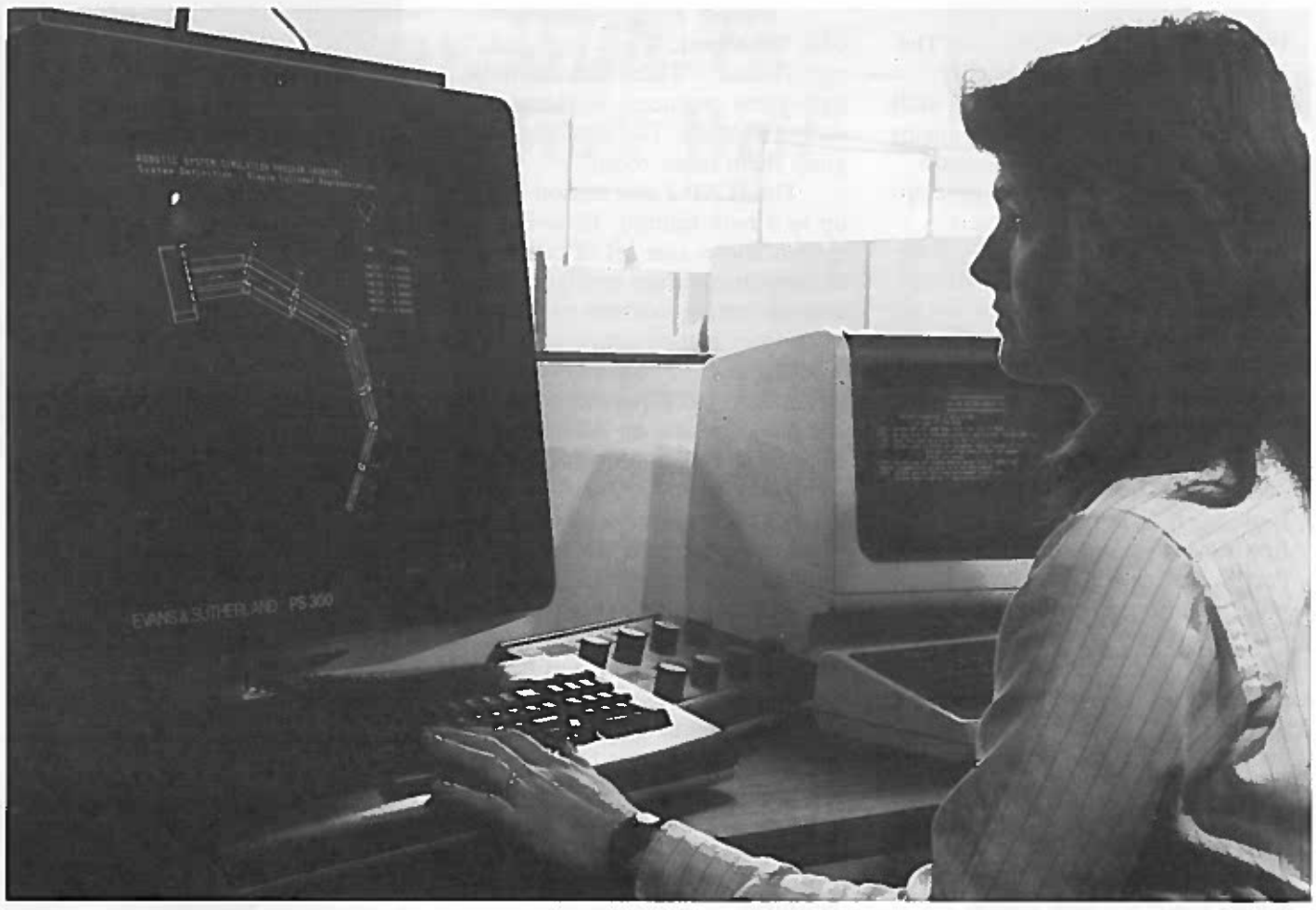
Besides fine-tuning RobSim's graphics, the Data Systems people will study ways to make them transportable — that is, able to be run on a wide variety of computer systems. Since the industry is just beginning to develop computer graphics standards, most robotic simulations now available are married to one particular computer system.

"However, based on our research, and trends we see in the industry, that should change in the next few years," says Meyer. "Standardization is gaining strength, and transportable graphics will soon be in great demand. We'll be able to provide that portability to RobSim."

The work also encompasses some research on artificial intelligence. This science speaks of equipping machines with decision-making capabilities. NASA is very interested in the uses of artificial intelligence for the Space Station program.

"Right now, if you want the robot to pick up a drill bit, you have to tell it every move it must make," says Meyer. "With artificial intelligence, the machine would learn certain movements, so you wouldn't have to keep programming it from scratch."

There may be an add-on to the job, in which Data Systems will use RobSim to evaluate various teleoperated robots. One of those, in fact, was designed by Grumman Space Systems.



Pictures Tell The Story. *In Grumman Data Systems' Graphics Laboratory, programmer/analyst Kristin Holmes displays a simulation of a robotic arm. This visual is based on a design created by the Grumman Space Systems Division. Data Systems is completely upgrading NASA's Robotics Simulation (RobSim) software. When the job is finished, the graphics will be closer to the real design. (Photo by Rich Breunig)*

Teleoperation uses video cameras and other feedback devices to provide the astronaut controlling a robot from afar with a feel for what the device is doing. Astronaut crews could handle much of the construction and maintenance work without going outside the station.

The next phase, a two-year contract beginning next year, encompasses further software refinements and studies. One such study will relate to the computer code, FORTRAN, in which RobSim is written. FORTRAN is widely used, but many computer experts say newer languages are easier and offer more capabilities.

"We'll study whether it makes sense to rewrite RobSim in one of those new languages," says Meyer. "That is, if we win the next phase. It is a competitive procurement, and we'll have to go through the proposal process all over again."

Data Systems has previously done robotic simulations for Grumman's Aircraft Systems Division. That division uses several robots in making aircraft parts. "However, this is much more sophisticated than anything we've done," says Meyer. "To say it's leaps and bounds ahead of the aircraft work would not be an exaggeration at all."

But he's confident the division has the computer smarts to do it. "We were up against Martin Marietta, and they knew RobSim inside-out because they developed it," he says. "We were able to convince NASA that we could do a better job."■

Investors Want To Know...

The following are some questions that arose at last month's annual meeting of the Grumman Employee Investment Plan (EIP). Due to space limitations, they were not included in *Grumman World*'s coverage of the meeting.

The EIP office is preparing a booklet outlining the plan's 1986 performance, which will include many of the charts presented at the EIP meeting. Requests must be in writing. To get a copy, write to: EIP office, mailstop C15-GHQ.

Can you predict what the guaranteed income fund blended rate will be over the next few years?

It should continue to outperform money market and three-month T-bill rates. It's hard to predict further ahead than that. In periods of declining interest rates, the fund will look good, because it's still got money invested that's two to four years old and outperforms the more short-term vehicles. But if interest rates start climbing, there will be a period where other funds will appear more attractive.

I had been using the EIP to save for a house. Under the new tax rules, is that still advisable?

Don't use the DCO for this purpose. The IRS used to allow hardship withdrawals of DCO money for buying a primary residence, college tuition, and major medical expense. Now, only the latter is permitted.

Regarding regular EIPs, the new law makes it costly to withdraw regular contributions deposited after January 1, 1987. You must take out a prorated portion of your earnings — which is taxable — and you are subject to a 10 percent excise tax.

You should, however, consider the excellent returns the EIP has offered in recent years. Your gain *may* outweigh the penalties. But each case is different — it depends on how much you've invested, where you've invested it, your income, and your tax status.

Remember, too, that the old rules still apply to withdrawals of money deposited before January 1, 1987. You can take money out without penalty if it has been in the EIP for two years; if not, you have to drop out of the EIP for three months.

For those drawing on an EIP, it would really help if Grumman would arrange for direct deposit of checks at the Bethpage Federal Credit Union. Has this ever been investigated?

It has been investigated, but Grumman has tabled it and instead is focusing on the other problems of administering the EIP. It's quite possible it will go into effect sometime in the future.

Newest Prowler Will Hone Its Edge In West Coast Lab

POINT MUGU, California — The EA-6B Prowler has continually sharpened its tactical jamming skills to shield Navy fighters from enemy radar. A new systems integration test station here is helping develop and test software for the latest version of this aircraft, the Increased Capabilities-2 (ICAP-2) Prowler.

Grumman products get put to the test by the Navy at Point Mugu, home of the Navy's Pacific Missile Test Center. The center occupies a strip of sparsely populated coastline between Los Angeles and Santa Barbara. Naval aircraft are test flown over a triangular area of the Pacific that extends hundreds of miles out from the coast.

"The Navy constantly upgrades tactical jamming software, and the new systems integration test station will help in the development and evaluation of such changes for the ICAP-2 Prowler," says Jim Homer, Grumman's program manager for Electronic Warfare Systems at Point Mugu. "Testing software with the station ensures a new system satisfies the operational requirement before it is flown — there's no risk factor inside the laboratory. The Navy also saves the expense of flying."

The software-oriented Point Mugu facility occasionally develops hardware, but its counterpart in Calverton, Long Island does most of that.

The ICAP-2 systems integration test station is behind several sets of locked steel doors in the Weapon Systems Support Laboratory at Point Mugu. The test station is a copy of the aft cockpit of the ICAP-2 aircraft, including the same array of weapon system controls and diplays.

Next to it is the ICAP-1 test station, which supports an earlier version of fleet software. This older station was made from a real aircraft forward section, so it looks a bit more authentic than the new one. "However, it was cramped," says Homer. "There can easily be a half-dozen engineers working at the station at once. The new station gives them more room."

The ICAP-2 test station is set up in a rack fashion. Its switching system allows one set of components to support multiple configurations, without having to move or disconnect equipment.

The ICAP-2 station is hooked up to a Digital Equipment VAX computer cluster, an avionics equipment bay, and a fin pod equipment bay. These bays house the ICAP-2's actual avionics. Instead of jamming aircraft, the test station counters radar scenarios created by the VAX computer. This powerful computer can generate thousands of performance points for testing.

In other cases, the signal characteristics of an actual radar will be input into the test station. This might occur when a new type of threat is developed. Through repeated exercises, engineers are able to alter the software to counter the threat.

New software must undergo exhaustive testing. Software may work wonderfully for the function it supports, but it could wreak havoc on other system operations.

"Individual software systems are themselves very complicated," says Homer. "When a system contains multiple interactive processors and programs, you've raised the level of complexity. Controlling and managing that much software is not insurmountable — but it is a lot of work."

In addition to its jamming role, the Prowler has taken on some new assignments, and the ICAP-2 systems integration test station will help in the development of these new capabilities. For instance, the Prowler is being equipped with HARM anti-radar missiles. The largest current project involves software for the black boxes and other hardware to support these missiles.

The lab was designed to keep up with change: a project is now underway to design a test system at Point Mugu to handle the next generation Advanced Capabilities (ADVCAP) Prowler. The ADVCAP aircraft are scheduled for delivery to the fleet in 1992.■

Realistic Testing Tool. *Marine Capt. Dave Myers conducts a training session on the EA-6B ICAP-2 Systems Integration Test Station at Pt. Mugu. The other Marines are (standing) Gy. Sgt. John Benson, Gy. Sgt. James Genovese, Sgt. Allan Pickering, (seated) Sgt. Tony Wolfe, (back to camera) Sgt. Roger Kriegshauser.*

Complex Electronics. *In the Weapon System Software Lab at Point Mugu, lab systems technician Jay Scott shows the lab's fin pod equipment bay to project engineer Charlie Harris. This equipment bay houses actual jamming equipment and is used with the EA-6B ICAP-2 systems integration test station for debugging aircraft software.*

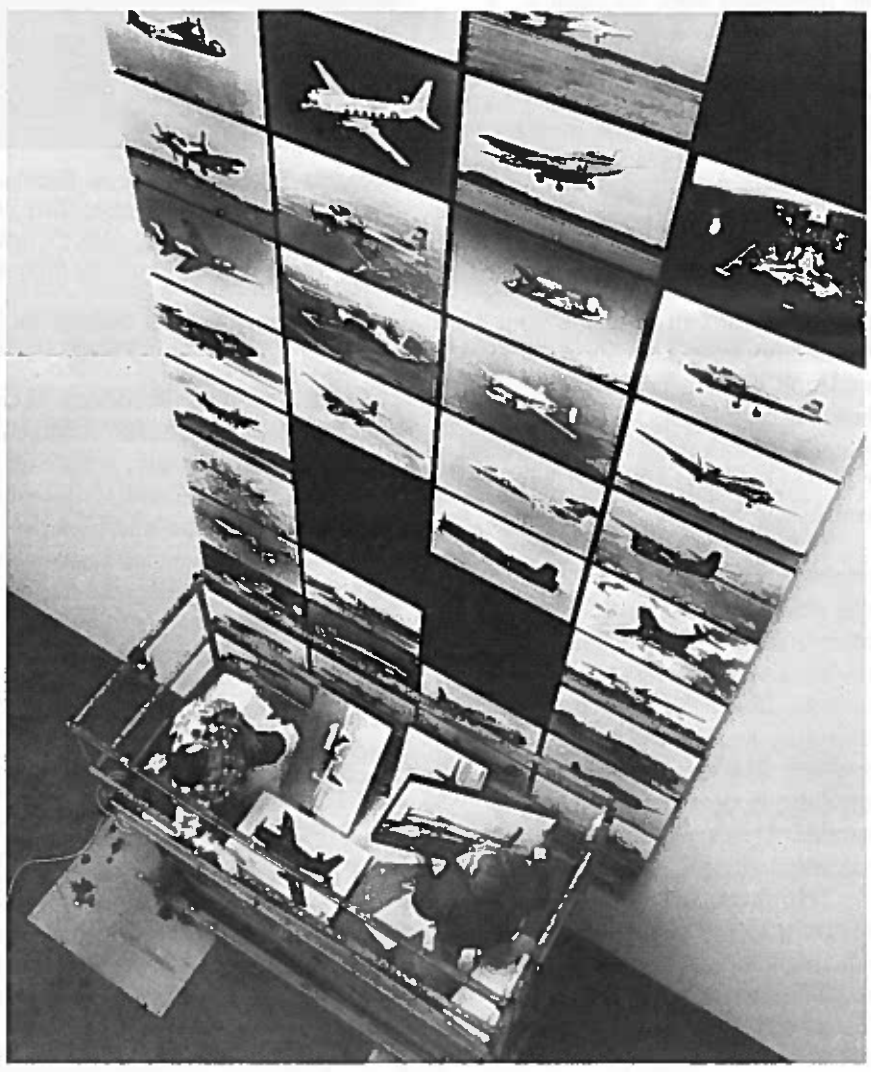


Photo Finishing. *Kevin Sharpe (checked shirt) and Ray Wagner of Facilities Maintenance set up the two new photo displays in Grumman Headquarters. The photos were from the files of the History Center and the Photo Lab. (Photo by Bob Settles)*

Historic View Of Grumman

A huge photo display of snapshots of Grumman's past now grace the eastern stairway of the Headquarters building in Bethpage.

The montage, completed early last week, spotlights the aeronautical achievements of the company. The pictures in the display were taken during first or early flights of over 40 Grumman aircraft, plus the Lunar Module.

Another display near the Headquarters cafeteria chronicles the way fighter aircraft have been developed over the years, and how the aerospace business has changed.

For instance, there is a copy of the FF-1 contract, for Grumman's first fighter. The contract was written on two sides of a single piece of paper. In contrast is a photo of the F-14 proposal, which required several volumes of information and documentation.

An Interview With Data Systems President Bob Myers

'It's Clear That If We Pick The Right Opportunities, Stay With The Right Customers, We'll Do Very Well'

Recently, Grumman World *talked to Data Systems President Bob Myers as part of its continuing series of interviews with top company officials.*

The division's 2,800 employees work primarily in Bethpage, Woodbury, and Holtsville, Long Island; and McLean, Virginia; with growing project operations in Huntsville, Alabama; Charleston, South Carolina; and San Diego. The division provides computer services for other Grumman divisions and outside customers. Overseas, the division is designing an engine test facility for Rolls-Royce of England and recently finished a computer aided design and manufacturing (CAD/CAM) center for a Singapore school. The division also encompasses a technical school, a third-party computer maintenance business, and a computer-output microfilm service.

GW: *What challenges does the division face in 1987?*

RM: 1986 is a tough act to follow. We did very well in achieving rapid sales growth and meeting our profit targets. So far this year, we haven't met our objectives for sales outside Grumman. After signing the $40 million Rolls-Royce contract, we lost five large bids. It looks like we'll be able to keep our profit margins up despite the losses by working cost-effectively on our ongoing programs, so we still have a chance to meet our profit targets for the year. But it's going to be awfully tough to meet our sales objectives.

We have a second chance for a significant win on the Army's Forces Command Information System, however. Boeing won the contract earlier this year, but two bidders — Unisys and Electronic Data Systems — protested the award. After a lengthy and careful review, the Army decided to issue a revised request for best-and-final offers to the original five bidders. This is a low-cost opportunity for Grumman to win a multimillion-dollar contract. As a result of information that came out from the protest, we know our proposal was rated very highly.

Within the company, we must treat each division as a separate entity: their needs all vary and our response must be a blend of existing systems, where practical, and new systems. I've been stressing this relationship within Data Systems, and I sense I'm making pretty good headway with the other divisions. There is no doubt in my mind that we're up to the task.

GW: *What do you do when you lose a contract? How do you motivate people to come back fighting?*

RM: Usually we'll have a self-assessment meeting with the proposal team. But with the losses we've had, we've done an in-depth assessment of our whole marketing and proposal process. We brought in an outside consultant, Shipley Associates, to do a proposal audit, and based on our findings and theirs, we're making some changes.

But when I look back at some of the losses, I know they really can't be laid at the feet of the technical people working on the proposals — and I've reassured them of that. It's clear that if we do the up-front management job properly, making sure we pick the right opportunities, stay with the right customers, we'll do very well.

GW: *Who do you see as Grumman Data Systems' main external customer? Does the division plan to pursue any new areas of business?*

RM: The U.S. government is the prime customer for our custom systems business. Our current focus is on the DoD and NASA: basically, the government aerospace community. But there are a lot of other non-defense opportunities for systems integration on the Federal level. For instance, in InfoConversion, we already do business throughout government — the IRS, Army, New York State...essentially, anybody who has a need for that technology.

GW: *What geographic areas hold the most potential for growth?*

RM: To narrow our marketing focus, we have reviewed our geographical sales structure and identified seven key areas: Long Island and New York State; Washington, D.C.; Charleston, South Carolina; Huntsville, Alabama; Dayton, Ohio; Colorado Springs, Colorado; and San Diego, California. We expect eventually to expand them so that instead of marketing centers, we will have working organizations and project teams doing work locally — as opposed to having everybody back here on Long Island.

That's been the case for awhile in Washington. We have approximately 150 people there supporting our efforts in the command, control, communications and intelligence (C^3I) world, and working on simulation projects and artificial intelligence research for other parts of Grumman. We're also becoming well established in Huntsville. Data Systems is now integrating a Cray supercomputer for the Strategic Defense Command, its second in the Huntsville area. Our efforts in Charleston and San Diego are at the critical beginning stage.

'We don't take on a development contract in the hope of winning a production contract: in our business, there isn't a production phase.'

GW: *About a year ago, Data Systems opened an office in the Albany area. How is the division's business with the New York state government going?*

RM: Well, nothing goes as fast as you'd like. We're currently deeply involved with New York's Department of Social Services on the Welfare Management System project, and we are performing extensive computer maintenance for the state — including its Lottery equipment. We're working on proposals for two seed contracts with the Department of Transportation. We're bidding on a DOT information resource management plan. It's not a big contract, but it lays a framework for future upgrades. We're also teamed with Peat Marwick Mitchell on a bid for a DOT financial management system.

GW: *How do you decide what projects to go after?*

RM: First of all, you should know about a project early-on, so you can have lots of dialogue with a customer and make sure he sees you as a viable competitor. A small requirements-definition contract is always a real plus. Second, you must be sure you have the technical resources to do the job, have a solution consistent with the customer's need, and one that is cost-effective. You also must make sure the competition doesn't have a big edge and doesn't have a lock on the contract because of some proprietary technology. If a company knows it has a problem, that company really ought to be smart enough to walk away from a competition.

GW: *What are the division's potential pitfalls, and what is it doing to avoid them?*

RM: We have to stay current with the technology and the product offerings of suppliers, and in this business, that gets pretty tough. A company has to keep its edge in database technology, in networks, in software and hardware. One of Grumman's advantages is that the demands of internal customers for systems on the cutting edge of technology are so great.

Plus, our folks aren't just management information system specialists, to which many of our competitors are limited. Our people are comfortable developing engineering systems and manufacturing software. In addition, we're involved with some divisions on actual product software — a whole new area for us. We've become the software manager for the Space Systems Division on the BSTS program, and we're active with Melbourne Systems on the software for Joint-STARS.

Our biggest weakness is our size. Three thousand people is small compared to some of our competitors. They have more discretionary resources. Therefore, they're able to go after more of the major systems jobs. Our bidding and proposal money is very limited and we have to be very, very careful in what we go after. We can't take on contracts that have poor terms and conditions, that won't allow us to make money. We don't take on a development contract in the hope of winning a production contract: in our business, there isn't a production phase.

GW: *Besides Singapore's Nanyang Technological Institute and the Rolls-Royce project, are you pursuing other international contracts?*

RM: Rolls-Royce is a high-visibility customer and it's very important to us to do a good job for them. It could lead to more work in Rolls-Royce. Beyond that, it's not clear. From a recent market study, it seems that systems integration, per se, is not understood in Europe. That may change, and we're keeping watch. But with the current U.S. market, we don't need to look to Europe for business.

On the other side of the world, Senior Vice President Gerry Sandler plans to visit Japanese aerospace companies that have expressed interest in our automatic telemetry station. It's too early to tell whether anything will come of that interest, but we will make them aware that Grumman can build that type of system and deliver it on time.

GW: *How are Grumman Systems Support, Grumman Data Systems Institute, and InfoConversion faring?*

RM: We expect our Systems Support business to grow very steadily. We're in 35 cities throughout the country and expect to add six or seven more this year. We're also building up our existing sites — in both people and the range of equipment they can handle.

(Continued on page 6)

An Interview With Bob Myers

(Continued from page 5)

The Grumman Data Systems Institute is suffering from fewer students, as are all educational institutions. But we look to the Institute to provide a community service, not turn a big profit. It adds to Grumman's image on Long Island and provides us with well-trained potential employees.

InfoConversion is in a fairly flat market, but the technology is changing. In fact, InfoConversion just got a contract to do some optical disk work for New York State. It's a small contract — $422,000 — but it's a nice start.

GW: *With Systems Support in so many locations, does that expose Data Systems to more potential information systems customers?*

RM: It definitely strengthens Grumman's national image and presence, particularly in areas where Grumman was not a well-known name. Since the unit services both commercial and government accounts, Grumman gets exposure beyond its classic military customers. Still, we have to sort through them and pursue the high-probability ones. We're focused right, and we'll stick with this strategy until conditions change.

GW: *What are your long term objectives?*

RM: I expect the DoD custom-systems business to be our biggest growth business. For example, the Army ForcCom Information System contract could be worth many millions of dollars. We're also bidding on a job for the Air Force Logistics Command called the Depot Maintenance Management Information System, a completely computerized production and scheduling system. We feel we have an big advantage in that we're familiar with an aircraft factory's computer needs, through our work for Grumman Aircraft Systems Division.

In five years time, we want to have sales outside well exceed our internal business: specifically, 60:40. One of the reasons it's been so slow in even reaching 50:50 is that our internal business has grown dramatically.

Our internal objectives are to continue to be an effective information systems supplier to all divisions of the company, and to provide the same courtesies and responsiveness as we do to external customers. By doing an effective job, we will avoid each division duplicating the expertise and resources built up over the years in Data Systems.

It's clear to all of us in the division that the opportunities are out there, and our team has shown itself to be very capable. We have scored extremely well in customer-satisfaction surveys. The trick is to maintain that kind of high image, and when you do well for somebody, don't get diverted; make sure you retain your concentration on that customer and his needs.■

People

A Hit In Art World

Grummanite Jamie Tawodi Reason was the focus of the English art world's attention this past week.

An electrician at Calverton, Long Island, Reason is a Cherokee artist and carver. He and Johnny Tiger Jr., a Creek-Seminole artist, put on a two-man, Native American art show at the Highgate Literary Institute in Highgate, London.

This is Reason's second show in Britain. He's participated in some 40 shows over the past five years; last year he won a first place award in the prestigious Gallup Inter-Tribal show in Gallup, New Mexico. His award-winning entry was a box carved from a single block of cedar. Reason says that the demand for his work increased dramatically after he won the prize.

"Cedar is a sacred wood to us. Two hundred years ago, cedar boxes were an important part of Cherokee society," says Reason. "Families stored treasured items in these boxes. They kept rattles, feathers, and strands of wampum, which the Cherokee society used to convey messages and not as money."

At one time there was a tribal box, similar to the Ark of the Covenant, the chest the Hebrews of the Old Testament of the Bible used to carry the stone tablets inscribed with the Ten Commandments.

"The tribal box held our sacred things; we don't even know what was in it," he says. "Sometime in the 1700s, during a march from one village to another, some Delawares stole it." It was never recovered.

The boxes Reason creates are similar to those his ancestors kept. "The designs are traditional, but done in a modern style."

He also paints in acrylics, watercolors and mixed media. "With my art, I try to reflect our history and culture."

History In A Box. *Jamie Tawodi Reason carved this cedar box to reflect the story of the Raven. In Cherokee mythology, the once-white bird was burned black when it tried to fetch fire for man from a burning sycamore log.*

Details Are Everything

Engineering changes caused delays in Bob DeMaio's A-6F program.

Every time Grumman made a significant change in the real A-6F, DeMaio had to stop work on his highly detailed model of the plane. An A-6F structural design engineer at Calverton, DeMaio spent a year finishing his competition-bound A-6F. He's not complaining. Working on the real-life A-6F gave him the ideal view of his subject.

DeMaio has about 165 models in his collection — and about 40 national and regional awards. His A-6F started life as an EA-6B kit. He cut the fuselage, changed the engine contours around the fuselage, modified seats from an F-14 kit, and added many details of his own creation.

"For the instrument panel I had to make special bezels. Bezels are the glass covers of each instrument face. I made the mirrors for inside the cockpit and I show wiring and piping behind the instrument panel," he says. This model, along with about a dozen others built by members of the Suffolk Scale Model Club, will be on display soon in the Building 6 lobby.

Model Engineer. *Since Bob DeMaio works on the real A-6F, he knows where every gauge and pipe is to go on his model. (Photo by Gerry Costello)*

Obituaries

Robert W. Butts of Hydraulic Subsystems, Calverton, Aircraft Systems Division, died March 27 at the age of 56. He had been with the company since 1955 and resided at Bay Ave. 45, Southampton, N.Y.

Robert G. Hoffman of Electric Cable Fabrication, Great River, Electronics Systems Division, died April 20 at the age of 51. He had been with the company since 1963 and resided at 34 Caffrey Ave., Bethpage, N.Y.

Thomas McPartland of Avionics Installation, Bethpage, Aircraft Systems Division, died April 20 at the age of 59. He had been with the company since 1950 and resided at 61 Valentine Ave., Glen Cove, N.Y.

Albert M. Treadwell of Inspection, Great River, Electronics Systems Division, died April 3 at the age of 59. He had been with the company since 1968 and resided at 660 Locust Ave., Bohemia, N.Y.

Retiree Obituaries

Ernst Bahrens at P.O. Box 343, Merrick, N.Y., died March 5, 1987. He retired in 1964.

Sylvester Brooks Jr. of 7846 Americana Cir., Glen Burnie, Maryland, died March 25, 1987. He retired in 1977.

John A. Choffel of 1337 Doyle Pl., Colorado Springs, Colorado, died January 26, 1987. He retired in 1968.

Alfred M. Colella of 92A Dosoris La., Glen Cove, N.Y., died April 1, 1987. He retired in 1978.

Charles E. Davis of 20 Orchard St., Lindenhurst, N.Y., died March 19, 1987. He retired in 1972.

Leonard F. Enlund of 223 Hill St., Elmont, N.Y., died April 7, 1987. He retired in 1984.

Bruno Galgano of 2395 Hudson St., East Meadow, N.Y., died April 1, 1987. He retired in 1962.

Rudolph E. Genovese of 4959 Woodland Forest Dr., Tuscaloosa, Alabama, died March 29, 1987. He retired in 1977.

Clifford C. Gilmore of 39 Cherry St., Lake Ronkonkoma, N.Y., died March 26, 1987. He retired in 1978.

John F. Haines of 2630 Inglewood St., East Meadow, N.Y., died April 2, 1987. He retired in 1977.

Edward A. Hansen of 4350 Meadowland Cir., Sarasota, Florida, died March 11, 1987. He retired in 1968.

John Kraseski of 91 E. Lakeland St., Bay Shore, N.Y., died March 15, 1987. He retired in 1986.

Joseph J. Oravetz at Box 5389, Rt. 5, Pearland, Texas, died April 1, 1987. He retired in 1976.

Gabriel Torok of 971 Baeck St., Lake Ronkonkoma, N.Y., died March 28, 1987. He retired in 1986.

Douglas VanNostrand of 77 Rutgers La., Huntington, N.Y., died March 13, 1987. He retired in 1975.

Marvin C. Weil of 97 Gladstone Ave., West Islip, N.Y., died March 12, 1987. He retired in 1986.

Alfred Polcek of 6201 Hwy. 41 North, Friendship Dr., Palmetto, Florida, died April 13, 1987. He retired in 1977.

Howard Weinert of 22 Wilson St., Rocky Point, N.Y., died April 13, 1987. He retired in 1970.

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Note: In recent months, changes have been made in several department names in various Grumman divisions. Company computers are still sorting these changes out. For that reason, this month's computer listing of Grummanites who celebrated service anniversaries does not contain individual department names.

Let Us Know

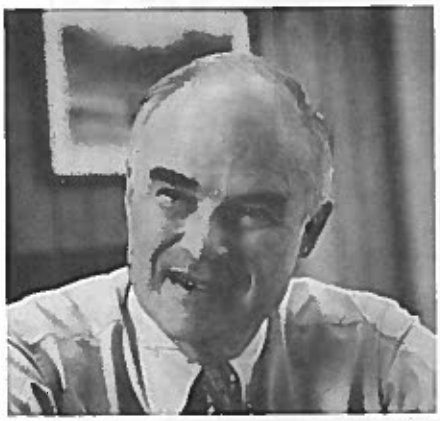
We'd like to know what you think about the things you see in these pages, and what you see going on in the company. Serious comments, questions and complaints are welcomed, and will be answered by the people most qualified to respond.

We'll get back to you promptly with their replies. If the topic is of general interest, we'll print it.

Letters to the editor should be addressed to *Grumman World*, 1111 Stewart Avenue, A22-GHQ, Bethpage, N.Y. 11714, and should include your name and address. Letters may be edited for clarity or space.

Tall Order. *In Stuart, Florida, Don Howanitz (L) and Mike Trainer rivet part of the 767 wing center section. Grumman has a subcontract to build this large structure for the Boeing 767 jetliner. All told, the crew at Stuart has built over 180 center sections since the program began in mid-1980. When one is finished, it is loaded on a railroad car and shipped diagonally across the U.S. to Seattle, Washington. (Photo by Jim Ferris)*

A Letter From The Chairman



Clint Towl, who preceded me as chairman of Grumman Corporation, used to say, "The only thing worse than having a government contract is not having a government contract." Clint was one of the founders of this company, and over the years he saw a lot of changes in the relationship between the government and its contractors.

These changes are tied to political and economic concerns. During times of national emergency, defense companies are the good guys. At other times, we may be called scoundrels and bandits who must be carefully watched.

For the past few years, we have been operating in an especially difficult business environment. Some observers believe that the relationship between the government and the defense industry is at its lowest point in years.

As a result, Grumman and all defense contractors are being asked to do more with less. Grumman people are feeling those pressures. They are faced with increasing amounts of work, and increasingly limited resources. They worry that their company is being pushed around by the Department of Defense, and they wonder where it's all going to end.

In some respects, the acts of some companies have created problems for all of us. Charges of waste, fraud and abuse leveled against some contractors have left Congress — and the American public — with little sympathy for the entire defense industry. At the same time, defense spending is under fire due to huge Federal deficits. Defense agencies, rather than give up what they want, put pressure on their suppliers to meet those requirements for less money — and Congress has been inclined to go along with it.

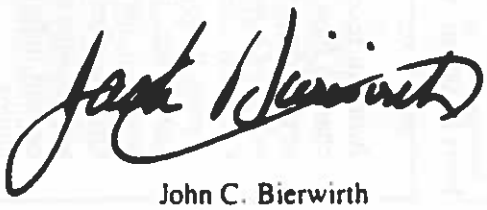
In 1985, the government lowered DoD progress payment rates from 90 percent to 80 percent. This will increase Grumman's financing costs by $150 million by the end of 1988. An additional reduction to 75 percent, which now appears likely, will mean another $75 million on top of that. The cost of borrowing this money must be paid for out of our profits. Worse, that's $225 million that we won't have to invest in better projects than financing the government's deficits.

We are also going through two basic changes at Grumman. We are still nailing down our new operating modes in our now divisionalized company. And we are adjusting to the computerization of the workplace: numerically controlled machines, personal computers, word processors, CAD/CAM, and more. Change creates its own stress, and that makes the pressures from Washington all the more difficult.

However, I think that we are starting to see signs in Washington of some rational reconsideration of all of these issues. People are beginning to see that driving suppliers to the wall may, in the short term, reduce costs — but in the long term, it will drive many companies out of the defense business, decrease competition, and decrease the number of people who will want to make their careers in this kind of work.

Our job now is to maintain a steady course. We must continue to deliver to our customers the best possible product for the best possible price — while refusing to be stampeded into doing anything that will damage our company.

These are difficult times, indeed, but we have been through difficult times before. We have always come out of them tougher and stronger and better — and we'll do it again this time around.



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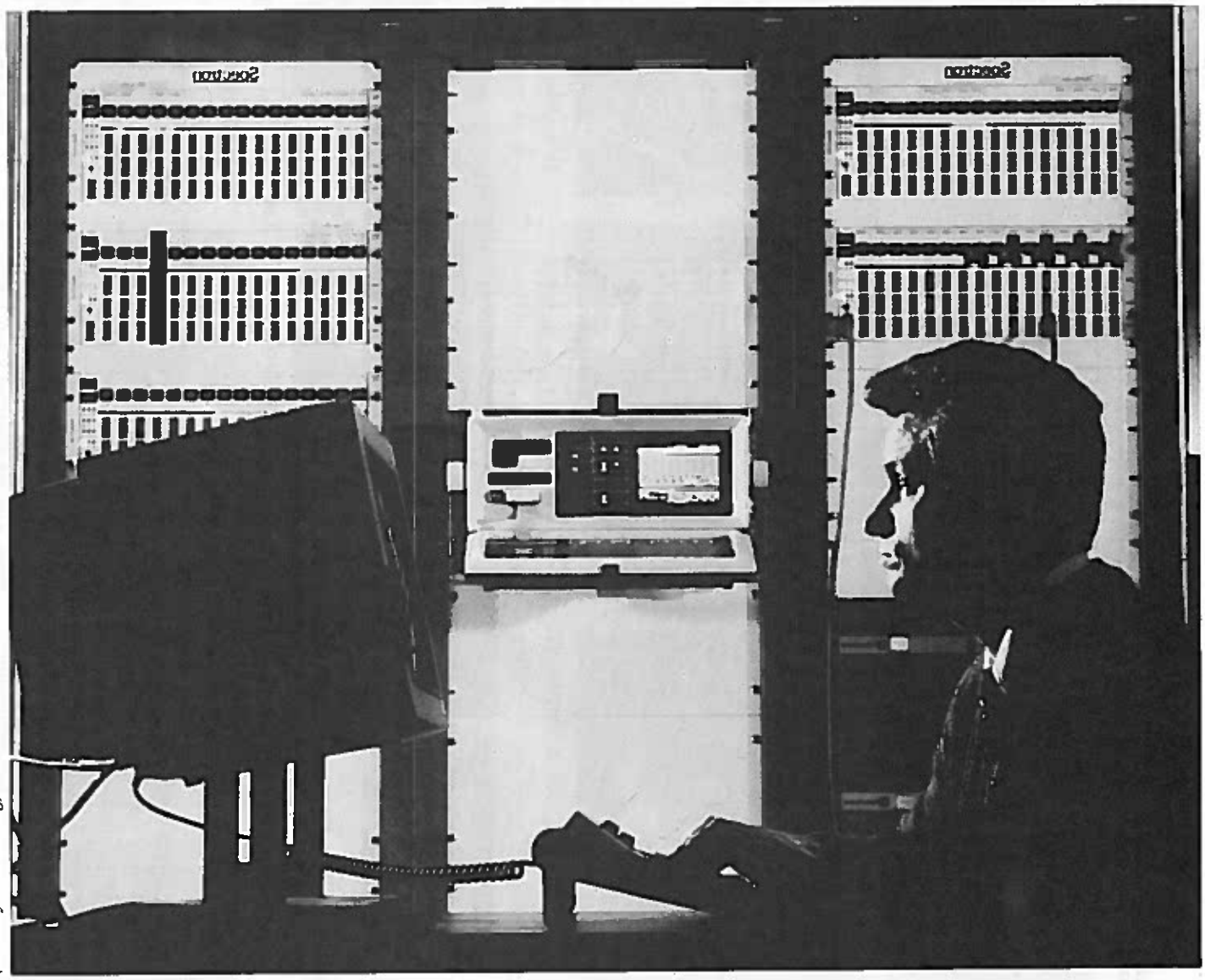

(Photo by Rich Breunig)

Watching 'Round The Clock

Teleprocessing analyst Bob Haas monitors the Timeplex system in Holtsville, Long Island, for data communications errors. This system in Holtsville's On-Line Control Center links the computers there with the communication hub in Bethpage.

Haas belongs to Grumman's Network Control Group. Assigned to a variety of sites, these specialists keep constant tabs on terminals, control units, central processors, modems, cables, microwave transmitters, and other computer-network components. From his terminal, Haas can see where a failure occurs, determine its cause, and either fix the problem or notify the appropriate vendor for hardware repairs.

The terminal in the background displays an assortment of letters, numbers, and symbols — which is the actual data passing through the network.

The network control people at Holtsville keep track of a lot of data. Since Grumman's on-line computers are up almost constantly, the group is staffed 24 hours a day, seven days a week.